G. H. JONES.

Casting Turbine Wheels.

No. 165,237

Patented July 6, 1875.

Fig. 1

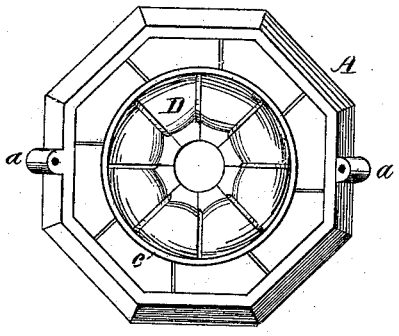


Fig. 2

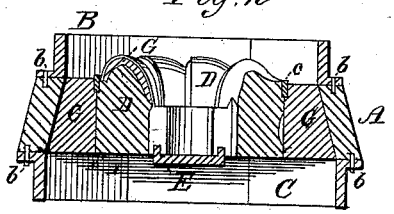


Fig. 3

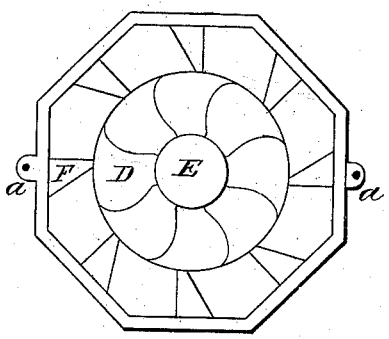


Fig. 4

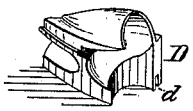


Fig. 6

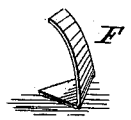
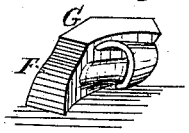


Fig. 5



WITNESSES

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GEORGE H. JONES, OF ROSE, NEW YORK.

IMPROVEMENT IN CASTING TURBINE WHEELS.

Specification forming part of Letters Patent No. **165,237**, dated July 6, 1875; application filed May 1, 1875.

To all whom it may concern:

Be it known that I, GEORGE H. JONES, of Rose, in the county of Wayne and State of New York, have invented a new and valuable Improvement in Molds for Casting Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of a plan view, showing the middle or core piece of a three-part flask with the wheel-pattern and cores in place therein. Fig. 2 is a vertical section through the core-flask, pattern, and cores. Fig. 3 represents the upper side of the core-flask with the wheel-patterns, cores, and partition-plates in the position they occupy when ready for completing the mold. Fig. 4 is a perspective view of one section of the wheel-pattern. Fig. 5 represents one of the cores when completed and ready for the mold. Fig. 6 is a perspective view of one of the partition-plates for placing between the different sections of the core.

This invention relates to the art of making molds for casting refractory metals, in which cores are used for the purpose of producing cavities of various forms and dimensions within the article cast, and is technically known as cored work, and in this present instance is especially designed to expedite the manufacture of that class of water-wheels known as turbines, and other works of a similar nature, in which long and tortuous passages in close proximity, but separated by a continuous partition, are required, the principal object being to enable the manufacturer to avoid the difficulties experienced heretofore in casting turbine wheels with the partitions between the chutes or issues in place, as, owing to their tortuous course and peculiar shape, it was found by experiment that if the most effective form was given to them it would be impossible to insert the cores needed to form them into a green sand mold, as the last one of the series required to complete the circle could not be placed without disarranging the others; and the invention consists in the method of constructing the flask, pattern, and mold, as will be hereinafter more fully described, and subsequently pointed out in the claims.

In the accompanying drawing, A is designed to represent the middle or central section of the flask, and is intended to receive the pattern and cores for casting the wheel. It is preferably of octagonal form, and of less diameter at its base than at its top, but it must be governed to a great extent by that of the article to be cast, it being necessary to have it only enough larger than the pattern, to give the requisite amount of sand between them. This flask A is provided with ears or projections *a*, having suitable holes for the reception of guide-pins *b* upon the drag B and cope C, so as to cause those parts to assume the same relative position to the core-flask A. This drag B and cope C are constructed in the usual manner, being made to conform in diameter with the sides of the flask A, which they are to occupy, and if large provided with cross-bars or other devices, to assist in retaining the molding-sand in position while the mold is being formed, and also when the metal is being poured into it. The pattern used is made in as many sections, D, as there are issues or buckets in the wheel to be cast, the divisions of said sections bisecting the buckets or issues in such a manner that after the core G is made in them they may be separately removed without injury to the core. The different sections D are connected together by means of a band, *c*, which encircles them, entering a recess formed for its reception, so that when in place it becomes a component part of the pattern. The opposite ends of the sections D are retained in their proper relation to each other by means of a cup-shaped hub, E, the edge of which enters a groove, *d*, formed in one end of each of the sections D for its reception, thus becoming a fastening, and at the same time forming a pattern for the hub of the wheel.

In molding, the various sections D are first put together, thus forming a complete wheel, which is placed upon a suitable molding-board, the hub E resting thereon. The core-flask A is then placed over it, the side having the greatest diameter being down. Partition-

plates F, of the form shown in Fig. 6 of the drawings, are then placed around the wheel, so as to extend radially from it to the flask, care being taken to see that no part of the openings are crossed by their inner edges, and that a small continuous space is left between them and the wheel-pattern, so as to prevent contact with the molten metal when the mold is filled. The inner surfaces of the cavities being oiled, as well as the convex sides of the partition-plates F, prevent the adhesion of the core, but the concave surface of the same is clay-washed, so that the core shall adhere to the plates, and facilitate their removal from the wheel-pattern and flask, and prevent breakage in handling. The space between the flask A and the wheel-pattern will be divided by the plates F into as many sections as compose the pattern. These cavities are all then carefully rammed full of any of the various compositions of sand, after which the whole is removed to the drying-oven for the purpose of evaporating all moisture from the core, and by baking to give them sufficient stability to admit of their being handled during the operation of removing the pattern.

The successive operations of forming the remainder of the mold are as follows: The drag B is placed upon the flask A, and rammed up, and the whole turned over. The cope C is then placed upon the flask A and rammed up, leaving the necessary openings, sprue, risers, and vents, after which the pattern is withdrawn by first removing the cope C, hub E, and core-flask A, the latter raising the core and pattern D. A molding-board is then clamped upon the top of the flask A to prevent the cores and the patterns from falling out while being turned over. The flask A is now drawn, and the band *c* removed, allowing the wheel-pattern D and cores B to be separated, and the patterns to be withdrawn, after which the cores are pressed together in their places; then replace the flask A, clamp and turn over the same, replace it upon drag E, and replace cope C.

Having now fully described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The water-wheel pattern, consisting of the sections D, provided with grooves *d*, the hub E, and ring *c*, substantially as and for the purpose specified.

2. The partition-plates F, constructed and applied substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

GEORGE H. JONES.

Witnesses:

GRENVILLE LEWIS,
NAT. E. OLIPHANT.